MARINE FISHERIES INFORMATION SERVICE

TECHNICAL AND
EXTENSION SERIES

No.33
November, December 1981

CENTRAL MARINE FISHERIES RESEARCH INSTITUTE
COCHIN, INDIA

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

MUSSEL CULTURE AT KARWAR, KARNATAKA STATE*

Lab-to-Land Programme

The green mussel, *Perna viridis* is an important item of food of the people of coastal Karnataka. The mussel popularly known as 'Neeli Kallu' in Kanarese and 'Kulate' in Konkani and Marathi occurs abundantly on rocks and other hard substrata in the inshore waters all along the coast. It supports a sustenance fishery of some consequence along the 144 km Uttar Kannada (North Kanara) coast from Majali in the north to Bhatkal in the south. The fishermen supplement their earnings by taking to mussel fishing not only during lean but also good seasons of mackerel, oil sardine, prawn and other fisheries. Mussel of marketable size harvested from natural beds fetch Rs. 10/- to Rs. 15/- per hundred in the locality and medium-sized ones Rs. 1/- to 3/- per hundred. But, the production from natural sources falls far short of the requirements of the people. In order to augment production of quality mussel through coastal aquaculture, the Lab-to-Land Programme for transfer of mussel culture technology to the fishermen of Binage, a fishing hamlet situated 7 km south of Karwar town, was initiated in November 1980.

The programme was channelled to ten fishermen, each representing one family of the low income group. These fishermen operate the traditional shore seines, 'Rampan' and 'Yendi' in the area. The rationale in selecting them for implementation of the programme is that once they feel that the rafts placed are their own and derive good returns from them, they would so reorient their traditional fishing activities as not to disturb the rafts in the sea which in turn ensures their total involvement in the programme and its success.

The Binage coastal village is part of the Karwar Development Block of Uttar Kannada (North Kanara District), Karnataka State. The village comprising 4 wards is densely populated. The fourth ward of the village is occupied exclusively by the fishing community comprising 134 families of 846 members.

As a first pre-requisite to the implementation of the programme, the Bench Mark Survey on the socio-economics of the fourth ward in general and the selected families in particular was taken on hand and completed on schedule. The selected ten families have 30 male and 18 female members, of whom 10 are children below the age of 14. Among the adults, 23 males are engaged in 'Yendi' operations; they also work as labourers in the 'Rampan' units. Of the 15 females, 7 eke out a living by selling fish in the local market and the rest attend to domestic chores. The ten families are categorised under the low income group.

Raft culture

The mussel culture programme could be implemented only after imparting training to the 10 involved fishermen and other members of the adopted families in all phases of culture. The fishermen were trained in the selection and preparation of material and fabrication of the rafts, floating and mooring the rafts at sea, location and collection of seed of the required size, cleaning the seed and seeding the ropes, suspending seeded ropes from the rafts and maintenance of the rafts at sea including periodical cleaning of the ropes to remove epifauna and fouling organisms. Training was imparted to the women and other members of the families in cleaning the seed and seeding the ropes.

The mussel culture rafts were located in two areas, viz., Binage Bay and Karwar Bay. Four rafts, two each at Binage and Karwar, fabricated out of casuarina and bamboo poles (tied together with coir and nylon ropes) and varying in size from 5 x 5 to 7 x 7 m were used for suspending the seeded ropes. Sealed empty oil barrels, each of 200 litres capacity, were used as floats for the rafts. Each raft was moored in the sea by means of two 100 kg iron anchors and 11 mm link diameter 20 m long iron chains at 6 to 7 m depth about 2 km from the shore. Initially, attempts were made to place the first raft near the Hulchi Rock off Binage as this area afforded protection to the raft from wave action and purse seiners. But, because of predation by fishes on transplanted mussel seed, the raft had to be moved and placed at a safer location between Hulchi Rock and Anjadiv Island. The second raft at Binage was moored near the first. These rafts of size 7 x 7 and 6 x 6 m floated on 16th December 1980 and 6th February 1981 had the full complement of 48 and 41 seeded ropes by 22nd January and 21st February respectively. In the Karwar Bay, the rafts of size 5 x 5 m floated on 23rd January and 24th February had the full complement of 33 and 32 seeded ropes by 6th February and 13th March 1981 respectively.

The seed for the programme emanated from the intertidal and submerged rocks situated in the vicinity

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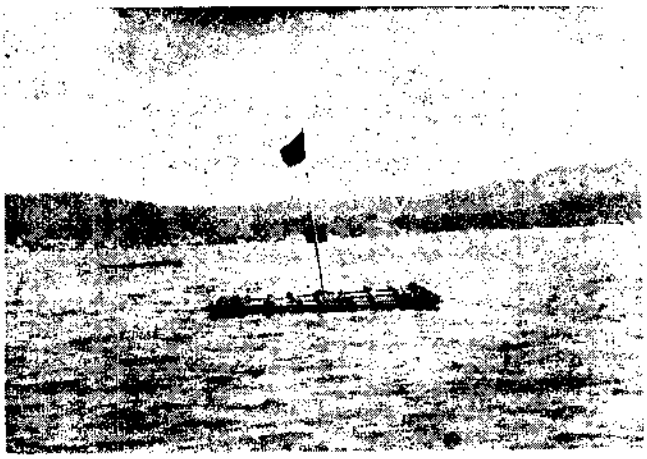

Fig. 1. Rafts in position in the Binage Bay

Fig. 3. Ropes being examined for growth of mussel

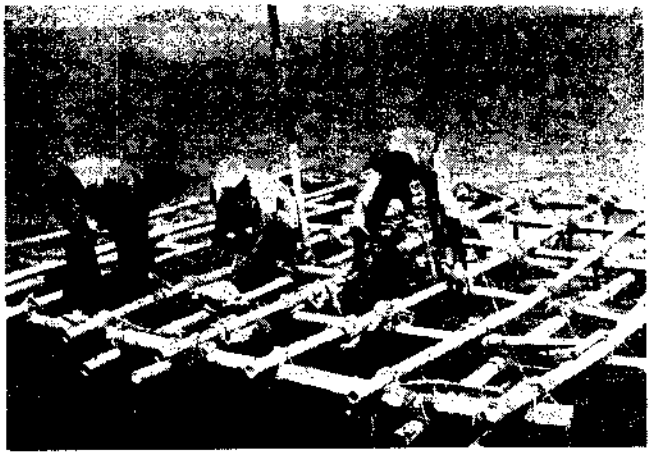

Fig. 2. Maintenance of raft at sea

Fig. 4. Lab-to-Land Programme participants with the harvest

Fig. 5. Harvested mussel ropes.

of the Karwar Research Centre of CMFRI and also Chendia. Immediately after collection, the seed were cleaned thoroughly to remove adhering mud and epifauna. Four kg of cleaned seed of size 10 to 20 mm go into the seeding of 4 m length of coir ropes of 20 mm diameter. The seed mussel were secured around the rope by stitching knitted cotton cloth of 25 cm width. The ropes, each with 4 m seeded length, were suspended from the rafts with the lower free end about 2–3 m above the bottom of the sea. The seed mussel got attached to the ropes by means of freshly secreted byssus thread in a matter of days when the cloth cover disintegrated.

The growth particulars of cultured mussel are presented in Table 1. Seed mussel having an average length of 17.50 mm and weighing 0.51 g transplanted on 20th January grew to a size of 62.60 mm weighing 14.70 g within a period of 134 days registering an average monthly growth rate of 10.10 mm in length and 3.18 g in weight. The maximum meat yield was 38.10% of the total weight obtained at the time of harvest on 4th June 1981.

Though the cultured mussel had not grown to marketable size, it was decided to harvest the crop and retrieve the rafts from the sea for future use because of the turbulent sea conditions during the South West Monsoon. The mussel were harvested from 2nd through 12th June 1981. The details of production, etc., are given in Table 2. In all, 3,751 kg of mussel were harvested from 120 ropes (480 m seeded length) recovered from the four rafts. But for the 3 ropes lost at sea, the recovery of seeded ropes was near-total and 2,080 kg of mussel were harvested at Binage. The average production per metre length of rope was 7.815 kg of mussel showing 7.815 times increase in seed weight. At Karwar, 31 ropes with harvestable sized mussel were lost due to poaching and 1,671 kg of mussel were obtained from other ropes. A good part of the harvest was distributed free among the 10 Lab-to-Land participants as also local fishermen and the public of Karwar as part of the Institute's extension programme and the rest sold.

Fishermen and the public alike had visited the Karwar Research Centre to see the harvest for themselves, the first to be witnessed in the area. Kumari Sobha Nambisan, I.A.S., the then Project Director, District Rural Development Society (erstwhile SFDA), Karwar evinced keen interest in the programme. The programme has so impressed the fishermen of Karwar as to make them feel that mussel culture is a viable proposition and can be relied upon to augment their meagre income.

Table 1. *Growth of the cultured mussel, Perna viridis. (The figures of length and weight are averages of* 100 *specimens).*

Date of observation	Length (mm)	Total weight (g)	Shell weight (g)	Meat weight (g)	Mantle water weight (g)	Percentage of shell weight	Percentage of meat yield	Percentage of mantle water weight
20–1–1981 (seed)	17.50	0.51	0.11	0.12	0.28	21.57	54.90	23.53
23–2–1981	30.24	2.38	0.73	0.79	0.86	30.67	36.13	33.19
11–3–1981	35.88	3.46	1.10	0.93	1.43	31.79	41.33	26.88
1–4–1981	44.90	6.63	2.28	2.32	2.03	34.39	30.62	34.99
1–5–1981	50.00	8.20	3.06	2.98	2.16	37.32	26.34	36.34
26–5–1981	58.44	13.74	4.84	5.00	3.90	35.23	28.38	36.39
4–6–1981	62.60	14.70	5.00	5.60	4.10	34.01	27.89	38.10

Read the figures in the last two columns interchanged.

Table 2. *Details of rafts and production of mussel.*

Details of rafts	Binage Bay		Karwar Bay	
	Raft No. 1	Raft No. 2	Raft No. 1	Raft No. 2
1. Size of the raft (m)	7 x 7	6 x 6	5 x 5	5 x 5
2. No. of ropes suspended	48	41	33	32
3. Length of seeded rope (m)	4	4	4	4
4. Weight of seed used for seeding one metre length of rope (kg)	1	1	1	1
5. Date of seeding	18–1–81 to 22–1–81	6–2–81 to 21–2–81	23–1–81 to 6–2–81	24–2–81 to 13–3–81
6. Date of harvest	2–6–81	9–6–81	12–6–81	12–6–81
7. No. of ropes harvested	45	41	16	18
8. Total weight of the harvest (kg)	1275	805	786	885
9. Average yield per metre length of rope (kg)	7.1	4.9	12.3	12.2
10. No. of ropes lost due to poaching	—	—	17	14
11. No. of ropes lost in choppy seas	3	—	—	—
12. Weight of mussel distributed in the village (kg)	—	805	386	485
13. Weight of mussel sold (kg)	1275	—	400	400
14. Amount realised from the sale (Rs.)	700/-	—	144/-	85/-

Shri P. M. Tandel, Managing Director, M/s Binage Ice & Cold Storage (Private) Ltd., Binage, Karwar and Member, CMFRI Management Committee was of considerable help in motivating the fishermen to take to mussel culture under the Lab-to-Land Programme. The help rendered by the staff of the Karwar Research Centre of CMFRI at various stages of the implementation of the programme is gratefully acknowledged.